

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Amendment of Parts 2 and 97 of the	)	ET Docket No. 02-98
Commission's Rules to Create a Low Frequency	)	RM-9404
allocation for the Amateur Radio Service	)	
	)	
Amendment of Parts 2 and 97 of the	)	
Commission's Rules Regarding an Allocation of a	)	RM-10209
Band near 5 MHz for the Amateur Radio Service	)	
	)	
Amendment of Parts 2 and 97 of the	)	
Commission's Rules Concerning the Use	)	RM-9949
Of the 2400-2402 MHz Band by the	)	
Amateur and Amateur-Satellite Services	)	

**NOTICE OF PROPOSED RULE MAKING**

**Adopted: May 2, 2002:**

**Released: May 15, 2002**

**Comments Due: 45 days from publication in the Federal Register.**

**Reply Comments Due: 60 days from publication in the Federal Register.**

By the Commission:

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## I. INTRODUCTION

1. The amateur radio service, governed by Part 97 of the Commission's Rules, provides spectrum for amateur radio service licensees to participate in a voluntary noncommercial communication service which provides emergency communications and allows experimentation with various radio techniques and technologies to further the understanding of radio use and the development of new technologies.<sup>1</sup> In this *Notice of Proposed Rule Making* ("Notice"), we address three *Petitions for Rule Making* filed by the American Radio Relay League, Inc. ("ARRL") requesting allocations for the amateur service in the 135.7-137.8 kHz, 160-190 kHz, 5250-5400 kHz, and 2400-2402 MHz bands.

2. By this action, we propose to modify the United States Table of Frequency Allocations and Part 97 of our Rules by:

- Adding a new secondary allocation<sup>2</sup> to the 135.7-137.8 kHz band for the amateur service for experimentation in the low frequency ("LF") region of the spectrum.<sup>3</sup>
- Adding a new secondary allocation to the 5250-5400 kHz band for the amateur service to facilitate high frequency ("HF") amateur service operations.<sup>4</sup>
- Upgrading the amateur service allocation from secondary status to primary status and adding a primary allocation for the amateur-satellite service in the 2400-2402 MHz band. This band is currently used for amateur-satellite service operations on a non-interference basis without limitations to emission types or types of communication.<sup>5</sup>

3. These proposed changes to our Rules would enhance the ability of the amateur service to conduct technical experiments with LF propagation and antenna design; allow amateurs to communicate at 5000 kHz when propagation conditions do not permit communication at 3500 or 7000 kHz; and provide protection for the amateur-satellite service now using the 2400-2402 MHz band. We also deny ARRL's Motion to Strike the comments of the IEEE Relay Communications Subcommittee, Michael McDonald, Paul Drum and Commonwealth Edison ("ComEd") from the record, as these comments added new information that merited consideration.

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<sup>1</sup> See 47 C.F.R. § 97.1.

<sup>2</sup> A secondary service shall not cause harmful interference to stations of primary or permitted services to which frequencies are already assigned or to which frequencies may be assigned at a later date; cannot claim protection from harmful interference from stations of a primary or permitted service to which frequencies are already assigned or may be assigned at a latter date; can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date. See 47 C.F.R. § 2.104.

<sup>3</sup> The low frequency region of the spectrum is defined as frequency bands between 30 kHz and 300 kHz.

<sup>4</sup> The high frequency region of the spectrum is defined as frequency bands between 3 MHz (3000 kHz) and 30 MHz

<sup>5</sup> See 47 C.F.R. §§ 97.3 (3) and 97.11.

## II. 135.7-137.8 kHz AND 160-190 kHz BANDS (RM-9404)

### A. Background and Summary of Petition

4. Internationally, the band 130-148.5 kHz is allocated to the fixed and maritime mobile services on a primary basis in all three International Telecommunications Union (“ITU”) Regions.<sup>6</sup> In addition, in Region 3, the radionavigation service has a primary allocation in this band.<sup>7</sup> Within the U.S., the band is allocated to both the fixed and maritime mobile services on a primary basis for both Federal and non-Federal Government users. The non-Federal Government services in this band are covered under Parts 23 and 80 of the Commission’s Rules, respectively. In the 135.7-137.8 kHz portion of the band, there are currently no non-Federal Government assignments and only one Federal Government assignment, as of January 25, 2002. The Federal Government assignment is for a coast station in the maritime mobile service communicating with ships in the Pacific Ocean.

5. The band 160-190 kHz is allocated on a primary basis to the broadcasting service in Region 1 and to the fixed service on a primary basis in Regions 2 and 3.<sup>8</sup> In Region 3, the aeronautical radionavigation service has a secondary allocation. In the U.S., the band is allocated to both the fixed and maritime mobile services on a primary basis for Federal Government users and also to the fixed service for non-Federal Government users. This service is regulated under Part 23 of the Commission’s Rules. As of January 25, 2002, there were no non-Federal Government assignments in the Commission’s database for this frequency band. There are ten Federal Government assignments for coast stations communicating with ships at sea and several fixed service sites in this band.

6. In addition, the LF spectrum is used by unlicensed devices. These systems do not have any allocation status, but are authorized to operate under our Part 15 Rules on an unprotected, non-interference basis with respect to all other users. Section 15.209 permits operation of authorized systems with field strengths of up to 4.9 microvolts/meter in the 9-490 kHz band. Additionally, Section 15.217 permits use of the 160-190 kHz band for general unlicensed operations limited to one watt total input power to the final radio frequency stage (exclusive of filament or heater power) with the length of the transmission line, antenna and ground lead not to exceed 15 meters. Emissions outside of the 160-190 kHz band must be attenuated by at least 20 dB below the level of the unmodulated carrier. Section 15.113 permits Power Line Carrier (“PLC”) systems on power transmission lines for communications important to the reliability and security of electric service to the public in the 10-1490 kHz band.<sup>9</sup> PLC systems are used to trip protection circuits if a fault, such as a downed power line, is detected in the power grid.

7. In our preparations for the World Administrative Radio Conference 1979, we considered a request from ARRL for an amateur allocation in the 160-190 kHz band under Docket No. 20271. At that time we declined to allocate the spectrum to the amateur service because of concerns about interference to the PLCs.<sup>10</sup>

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<sup>6</sup> See 47 C.F.R. §§2.104 and 2.106. The U.S. is located in ITU Region 2.

<sup>7</sup> ITU-R Region 3 is generally the Asia-Pacific Region. See 47 C.F.R. §2.104(b)(3).

<sup>8</sup> ITU-R Region 1 is generally Europe, Africa and the Middle East. See 47 C.F.R. §2.104(b)(1).

<sup>9</sup> See 47 C.F.R. §§ 15.113, 15.209 and 15.217. See also 47 C.F.R. §2.106 footnote US294.

<sup>10</sup> See *Report and Order*, Docket No. 20271, 70 FCC 2d 1193 (1978).

8. On October 22, 1998, the ARRL filed a *Petition for Rule Making* (“*LF Petition*”) requesting that we amend Parts 2 and 97 of our Rules<sup>11</sup> to create a domestic secondary allocation for the amateur service in the LF range of the spectrum in the 135.7-137.8 kHz and 160-190 kHz bands.<sup>12</sup> ARRL states that there is no amateur service allocation in the LF spectrum range. Such an allocation, they argue, would enhance technical self-training in areas such as Morse Code and digital communications and experimentation in LF communications.<sup>13</sup> ARRL points out that numerous amateur radio and non-amateur radio operators in the U.S. are using the 160-190 kHz band pursuant to Section 15.217 of our Rules.<sup>14</sup> ARRL states that the power and antenna limitations of these rules, noted above, preclude or inhibit effective experimentation.<sup>15</sup> ARRL desires more liberal operating conditions, such as an output power limit of 200 W peak envelope power (“PEP”)<sup>16</sup> and 2 W effective isotropic radiated power (“EIRP”). These power limits would allow amateur radio operators to conduct antenna design and construction experiments, and long range propagation studies with continuous wave (“CW”) telegraphy,<sup>17</sup> RTTY,<sup>18</sup> data, single-side band (“SSB”) telephony and image emission types. In order to ensure that these experiments are conducted by knowledgeable operators, ARRL proposes that operators be required to hold a General Class license or above.<sup>19</sup>

9. The *LF Petition* notes that, although there is no international allocation for the amateur service in these bands, the European Posts and Telecommunications Commission<sup>20</sup> (“CEPT”) countries have provided a secondary amateur allocation in the 135.7-137.8 kHz band and limited power output to 1 W effective radiated power (“ERP”).<sup>21</sup> In addition to the general CEPT decision, individual CEPT

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<sup>11</sup> See *Petition for Rule Making*, RM-9404, Public Notice (rel. November 23, 1998) Report No. 2306. The *LF Petition* specifically requests amendment of 47 C.F.R. §§ 2.106; 97.3 (b); 97.301(b), (c), and (d); 97.303; 97.305(c); and 97.313(c).

<sup>12</sup> In addition, the Commission received a petition for rulemaking from Mr. Nickolaus E. Leggett on November 27, 1998. This petition also requested the Commission consider a secondary allocation to the amateur radio service in the 135.7-137.8 kHz and 160-190 kHz bands. As these bands are the same as contained in the *ARRL LF Petition (RM-9404)* which was placed on public notice for comment, we find that it is not necessary to put the Leggett petition out for comment as the record is adequate for the purposes of this *Notice and Order*. Thus, it will be treated as a comment in support of the *LF Petition*.

<sup>13</sup> See *LF Petition* at i.

<sup>14</sup> See *LF Petition* at i.

<sup>15</sup> These transmissions often only travel a fraction of a kilometer. However, amateurs experimenting with communications using continuous wave, RTTY (see footnote 18 for a definition of RTTY) or pulse transmissions can achieve distances of 160 to 480 kilometers under favorable propagation conditions. In rare cases, with very well tuned devices, they can achieve distances of approximately 1300 kilometers. However, with an allowable power of 5W ERP, they can achieve transcontinental communications. See [www.lwca.org](http://www.lwca.org), the [Longwave Home Page](#), for more information.

<sup>16</sup> PEP is defined as the average power supplied to the antenna transmission line by a transmitter during one radio frequency cycle at the crest of the modulation envelope taken under normal operating conditions. See 47 C.F.R. §2.1.

<sup>17</sup> Continuous wave signals are unmodulated carrier frequencies. Information is transmitted by turning the carrier on or off in recognized patterns, such as Morse Code.

<sup>18</sup> RTTY is defined as narrow-band direct-printing telegraphy with specific emission designators. See 47 C.F.R. §97.3(c)(7) for more information.

<sup>19</sup> The amateur radio operator licenses that are above General Class include the Advanced and Amateur Extra Class operator licenses. See 47 C.F.R. §97.9 for more information.

<sup>20</sup> CEPT is an organization under the European Union umbrella that deals with spectrum management issues.

<sup>21</sup> ERP and EIRP differ in magnitude by 2.15 dB. This is caused by a 2.15 dB increase in radiated power from a dipole antenna relative to an isotropic antenna.

member nations have instituted their own domestic rules. For example, Belgian radio amateurs are permitted to use up to 1 kilowatt transmitter output power.<sup>22</sup>

10. ARRL states that a review of Federal Government frequency assignments in the 130-160 kHz and 160-190 kHz band shows that the U.S. Navy has assignments in both bands and the U.S. Air Force Groundwave Emergency Network (“GWEN”) has assignments in the 150-175 kHz band. ARRL asserts that, based upon information and belief, and upon inquiry of the Navy staff, incumbent primary status Navy operations in the LF range are increasingly inactive and other Federal uses of the band are being phased out in favor of other bands.<sup>23</sup> As additional evidence of this, ARRL states that groups of Part 15 experimenters in this band have logged signals heard in the 130-160 kHz and 160-190 kHz bands, and that no signals have been noted other than longwave broadcast signals, mostly from Europe. Nevertheless, ARRL requests a secondary allocation to protect primary allocations in the bands. The petition also does not specifically address sharing with the primary fixed and maritime mobile services.

11. Regarding sharing with Part 15 PLC operations, ARRL argues that such operations have no allocation status and thus do not merit protection from services with allocation status. Nevertheless, ARRL asserts that the interference potential of its proposed amateur operations to PLCs would be minimal. Specifically, ARRL indicates that power grid faults are detected through either Directional Comparison Blocking (“DCR”) or Direct Transfer Trip (“DTT”) PLC methods. The DCR method does not transmit a signal until there is a fault, and interference can cause adverse performance only if it occurs simultaneously with a fault. ARRL argues there is a low probability of an amateur station being close to a power line and transmitting simultaneously with a DCR (“guard”) signal. On the other hand, the DTT method transmits a continuous guard signal, which is frequency shifted during a fault. ARRL argues that DTT systems will be protected because amateur service stations will detect the guard emission and avoid using that channel.<sup>24</sup> ARRL also points out that voice and data communications are performed over PLCs, but that interference to such uses are not serious because the communications can be repeated.<sup>25</sup>

12. ARRL also claims that PLCs operating in the 135.7-137.8 kHz and 160-190 kHz bands are not likely to receive interference which might interrupt the power grid, even if co-frequency operation occurs.<sup>26</sup> ARRL’s analysis shows that with its suggested EIRP of 2 W, a separation distance of about 1.3 km from PLC systems operating on 161 kV power lines is needed to avoid interference. The separation distance decreases to approximately 170 meters for PLC systems operating on 765 kV power lines.<sup>27</sup> ARRL contends that, at these frequencies and corresponding wavelengths, the antenna inefficiencies and ground losses would prevent amateur operations from generating interfering signals. ARRL states it could not find any record of false trips of PLC equipment and that a 1995 survey of the power utilities

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<sup>22</sup> See *LF Petition* at 6.

<sup>23</sup> *Id.* at 8. ARRL claims that the GWEN system is to be deleted and the transmitter sites are to be used for other purposes and managed by the U.S. Coast Guard.

<sup>24</sup> Typical amateur operations use a “listen-before-transmit” technique whereby the operator listens to ensure the channel is not in use before transmitting.

<sup>25</sup> See *LF Petition* at 9.

<sup>26</sup> The power grid is made up of a generating station, which outputs the electricity onto high voltage transmission lines (50 kV to 765 kV). These lines carry the power to a substation which reduces the line voltage to below 50 kV for use by businesses and housing subdivisions. These 50 kV lines are further reduced via local transformers to the typical 120/240 V used for providing electrical service to individual households.

<sup>27</sup> See *LF Petition* at 15.

shows that interference from licensed systems is not a significant problem.<sup>28</sup> ARRL also asserts that an increasing number of PLC systems use synthesized transmitters that allow easy frequency changes and that many systems employ forward error correction (“FEC”) digital transmissions of data, making the PLC system nearly immune to interference.<sup>29</sup>

## B. Comments

13. Thirty-two parties filed comments on the *LF Petition*.<sup>30</sup> Comments from amateur operators generally support an amateur allocation in the LF range.<sup>31</sup> Galasso states that this secondary allocation would be very helpful and supports a 200 W PEP limit with no EIRP limit to permit experimentation to develop antennas with better efficiency. Rayburn also supports the *LF Petition*, indicating that the current amateur service operations have pioneered the use of binary phase shift keying (“BPSK”) signaling and coherent CW in these frequency bands.

14. Texas Instruments (“TI”) and HID Corporation (“HID”) express concern with ARRL’s request for the 135.7-137.8 kHz band. These companies manufacture radio frequency identification (“RFID”) equipment which operates in the nearby 121-134.2 kHz band under Part 15 of our Rules. TI and HID point out that RFID devices use inductive coupling and therefore rely on the magnetic-field (“H-field”) component of a signal for communications.<sup>32</sup> HID and TI claim that amateur radio operators will likely use loop antennas because of space limitations. TI contends that the resulting magnetic field from a 200 W PEP amateur service transmitter fed into a loop antenna may cause interference into an RFID system.<sup>33</sup> HID also claims that amateur station signals can mix with HID’s 125 kHz carrier frequency and pass into the RFID receiver.<sup>34</sup> Further, HID fears that amateur radio licensees will use transceivers with high harmonic content, causing interference to RFID systems.<sup>35</sup> TI proposes that, if this band is allocated to the amateur service, operations be limited to electric field antennas, power limited to 2 W EIRP, and interference be defined such that Part 15 devices are considered as not causing interference to any authorized amateur operations.<sup>36</sup>

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<sup>28</sup> *Id.* at 17, citing Hohn, J.W., et.al, POWER LINE CARRIER PRACTICES AND EXPERIENCES, IEEE Transactions on Power Delivery, Vol 10, No. 2, April 1995.

<sup>29</sup> *Id.* at 16.

<sup>30</sup> The *LF Petition* was placed on public notice on November 23, 1998. See Public Notice Report No. 2306. A list of commenters is in Appendix A.

<sup>31</sup> See, e.g., *Ex parte* Comments of Eyre-Eagles at 1, *Ex parte* Comments of Galasso at 2, *Ex parte* Comments of Leggett at 1, and *Ex parte* Comments of Rayburn at 1.

<sup>32</sup> Radio waves have both an electric and a magnetic component. In the LF spectrum, antennas (sensors) may be designed to utilize one or the other component for more efficient communication.

<sup>33</sup> See Comments of Texas Instruments, at 3.

<sup>34</sup> See *Ex parte* Comments of HID Corporation at 1-2. Signals mix in the front end of a receiver and create sum and difference signals which may then be passed through the receiver’s filter if they are close enough to the desired signal’s frequency. For example, a signal at 125 kilohertz may mix with a signal at 135.8 kilohertz and create new 10.8 kilohertz and 260.8 kilohertz signals. If the receiver is looking for signals near 10 kilohertz, this new signal can interfere with the expected signal.

<sup>35</sup> *Id.* at 4. HID asserts that loop antennas emphasize H-field coupling up to 1 wavelength (2.21 km) away and are prone to broadband harmonic emissions if not properly tuned.

<sup>36</sup> See Comments of Texas Instruments, at 3. Defining interference in the manner proposed by TI would permit a Part 15 device to cause interference to operations of a secondary service. However, Part 15 devices would not be protected from amateur stations operating under the proposed secondary allocation.

15. ARRL replies that the typical amateur station EIRP in the 135.7-137.8 kHz band will be on the order of 0.5 W, which is significantly below the power limit used by TI in its analysis, and thus amateur radio operations should not cause interference to RFID systems. ARRL also states that the antenna bandwidth of amateur operations in this band would be “very low,” so that adjacent frequency interference is unlikely.<sup>37</sup> ARRL argues that the Commission should not specify antenna types because that would stifle experimentation, and notes that amateur radio licensees will likely use long wire antennas that will emphasize electric field radiation to facilitate sharing with magnetic-field RFID systems.<sup>38</sup>

16. A number of commenters raised concerns about the impact of the proposed amateur service operations on PLC operations in both frequency bands.<sup>39</sup> Commenters point out that PLC use of these bands is significant. UTC indicates that there are approximately 10,000 PLC terminals operating in these bands.<sup>40</sup> It points out that the Commission has noted the importance of the PLC operations, and in 1978 declined to introduce new broadcast and amateur allocations to protect PLC operations in the LF region.

17. The Institute of Electrical and Electronic Engineers (“IEEE”) Relay Communications Subcommittee (“the Subcommittee”) of the IEEE Power Systems Relay Committee indicates that the Subcommittee echoes the Commission’s concerns about the possibility of interference to PLCs from amateur radio operations mentioned in Docket No. 20271. The Subcommittee claims that the ARRL *LF Petition* is mistaken regarding interference to PLC systems. It submits that, of the two different types of PLC systems, the ON/OFF type is normally off except for short encoded bursts 1-3 times per day.<sup>41</sup> It states that interference to this type of PLC system will cause unfaulted lines to disconnect from the power grid resulting in outages.<sup>42</sup> The Subcommittee argues that an amateur radio operator cannot rely on a “listen before talk” protocol to avoid the frequency being used by an ON/OFF PLC system because the system is normally off and no signal is transmitted. The Subcommittee submits that the second type of PLC system uses frequency shift keying (“FSK”).<sup>43</sup> It indicates that with FSK systems, a fault causes a status signal to shift frequency which trips the relay. The Subcommittee states that it takes approximately 32 milliseconds to start the process, and it cannot be stopped once started.<sup>44</sup> It further states that, in the FSK system, transmit and receive frequencies are different and the amateur radio operator will not be able to determine what frequencies to avoid since the shifted frequency is normally not used unless there is a

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<sup>37</sup> See Reply Comments of ARRL, at 3.

<sup>38</sup> *Id.*

<sup>39</sup> On March 30, 1999, ARRL filed a *Motion to Strike* (“*Motion*”) comments from the IEEE Relay Communications Subcommittee, Michael McDonald, Paul Drum and ComEd because they were more than 30 days late and ARRL was not served in violation of Section 1.405 (b) of the Commission’s Rules. We believe that it is in the public interest to have as complete a record as possible in this proceeding. We further note that while ARRL was not properly served, their *Motion* included a substantive response to these comments and was considered by the Commission as well. Therefore we deny ARRL’s *Motion to Strike*.

<sup>40</sup> See *Ex parte* Comments of UTC at 2.

<sup>41</sup> ON/OFF keyed PLC systems are similar to DCR systems described in the *LF Petition*.

<sup>42</sup> See *Ex parte* Comments of the IEEE Relay Communications Subcommittee, dated February 12, 2001 at 1.

<sup>43</sup> FSK PLC systems are similar to DTT systems described in the *LF Petition*.

<sup>44</sup> See *Ex part Comments* of the IEEE Relay Communications Subcommittee, dated February 12, 2001 at 1.

fault on the power system.<sup>45</sup> Commonwealth Edison (“ComEd”) and other utilities support the Subcommittee’s concerns.<sup>46</sup>

18. The Subcommittee also disagrees with ARRL’s assessment that there is no risk of interference to PLC operations beyond 1.34 km from amateur stations operating with an EIRP of 2 W. It takes issue with the *LF Petition*’s statement that the noise floor of the PLC system is –30 dBm on lower voltage lines such as 161 kV power lines and as high as –5 dBm on 765 kV lines per the IEEE 643-1980 standard. The Subcommittee states that the IEEE standard for PLCs actually provides various noise data for both fair and adverse weather and indicates that the fair weather data is valid for more than 75% of the time. It notes that ARRL used the highest numbers in the adverse weather range for their analysis, and that this results in a 10-15 dBm decrease in sensitivity for lower voltage lines and 20-25 dBm for 765 kV lines.<sup>47</sup> The Subcommittee therefore argues that ARRL understates the necessary separation distances needed to protect the PLCs.

19. The Subcommittee also states that while utilities may use fiber in new installations, it is not cost-effective to retrofit existing PLCs.<sup>48</sup> ComEd agrees with this assessment and also notes that forward error correction is not widely used.<sup>49</sup> The Southeast Reliability Council and the Florida Reliability Council argue that PLC communication is the only viable means of providing the protection, control and operation for many transmission facilities.<sup>50</sup> UTC asserts that utilities have experienced problems with their PLCs that could have been caused by interference, but sources of interference are often difficult to identify. In addition, UTC states that many cases of interference are not documented, because most facilities do not have the monitoring equipment necessary to determine the cause of the tripping of breakers if no fault is found in the power grid. UTC submits that one utility, CP&L, did investigate interference to their network and determined that the false signals were coming from stray radio signals.<sup>51</sup>

20. ComEd asserts that amateur radio licensees may have difficulty in calculating EIRP, the power measurement suggested by ARRL. It argues that because ARRL suggests no restrictions on antenna size or design, it would be difficult to anticipate the gain of the antennas used.<sup>52</sup> The Subcommittee notes that a Dutch amateur radio licensee has developed a kite-borne 900-foot antenna with higher efficiencies<sup>53</sup> that allows the amateur station EIRP to be in the range of 10-15 W with a transmitter output power of 150 watts.<sup>54</sup>

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<sup>45</sup> *Id.*

<sup>46</sup> See, e.g., *Ex parte* Comments of Commonwealth Edison, dated March 8, 1999, at 4, and Comments of Alabama Power, Georgia Power, Gulf Power, Michigan Power and Savannah Electric at 1.

<sup>47</sup> See *Ex parte* Comments of the IEEE Relay Communications Subcommittee, dated February 12, 2001, at 3.

<sup>48</sup> See *Ex parte* Comments of the IEEE Relay Communications Subcommittee, dated January 29, 1999, at 1.

<sup>49</sup> See *Ex parte* Comments of Commonwealth Edison, dated March 8, 1999, at 4.

<sup>50</sup> See *Ex parte* Comments of Southeast Reliability Council at 1 and the *Ex parte* Florida Reliability Council at 1.

<sup>51</sup> See *Ex parte* Comments of UTC at 4.

<sup>52</sup> See *Ex parte* Comments of Commonwealth Edison, dated March 8, 1999, at 3.

<sup>53</sup> The longer the antenna, the more radiated power that can be achieved with the same transmitter output power. By attaching a wire to a kite, the Dutch amateur radio operator effectively created a long-wire antenna much closer in length to ideal quarter-wave monopole length. The higher the efficiency of an antenna, the more power can be radiated from it for a given transmitter output power. For example, under the current antenna length limit of 15 m (See 47 CFR § 15.217) antenna efficiencies are



21. In reply ARRL, states that its analysis assumes zero ground loss between the amateur stations and PLC systems and thus leads to overstatement of the separation distance necessary to protect a PLC system; the actual distances should be much less.<sup>55</sup> ARRL states that an amateur LF station would have to be mounted on a utility pole to cause co-channel interference.<sup>56</sup> Lastly, ARRL claims that amateur service stations would not exceed power limitations because the antenna efficiency would limit radiation from a 200 W PEP transmitter to under 0.5 W EIRP. Further, ARRL notes that its proposal would limit access to the LF allocation to licensees who have demonstrated competence by passing an examination, and that it would publish a LF handbook for amateur radio operator's use.<sup>57</sup>

### C. Proposal

22. We are persuaded by ARRL's arguments to consider whether a secondary amateur service allocation in the LF range of the spectrum would serve the public interest because amateur experimentation could lead to a better understanding of communication techniques in this frequency range. As discussed below, we are proposing to allocate the 135.7-137.8 kHz band to the amateur service on a secondary basis. This allocation would allow amateur radio operators the ability to experiment more freely with propagation, antenna design and antenna construction. However, we are concerned about potential interference to PLC systems in the 160-190 kHz band. We declined previously to provide an allocation for the amateur service in the 160-190 kHz band because of potential interference to PLC systems, and we believe that PLC use of this band continues to pose sharing problems with an amateur service allocation. Therefore, we are not proposing an allocation in the 160-190 kHz band, although amateur use of the 160 kHz band may continue under our Part 15 rules.

23. Incumbent use of the 135.7-137.8 kHz band is relatively light and thus a secondary amateur service allocation in this band raises few concerns. An analysis of a portion of the UTC database of PLC systems by Commission staff shows that PLC system density is significantly less in the 135.7-137.8 kHz band than in the 160-190 kHz band.<sup>58</sup> Consequently, there should be many areas where PLC systems would not be in close proximity to any future amateur operations. Further, domestic primary services in this band would be minimally affected by an amateur service allocation. The Government Master File ("GMF") and Commission's databases identify only one Federal Government assignment in the 135.7-137.8 kHz band. The amateur service has extensive experience in operating on a secondary basis with primary status services in frequency bands with long range capabilities and we believe the same would apply here. We expect that interference would be rare because amateur radio operators have apparently demonstrated their effective use of the "listen-before-transmit" protocol, which also can be utilized with the primary users of this band. Regarding the RFID uses in the lower adjacent band and the

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approximately 0.02%. If the allowable antenna length is increased to 60 m, then the efficiency increases to 1%. Thus an EIRP of 0.04 W radiating from a 15 meter antenna increases to 2W when a 60 meter antenna is used. *See LF Petition* at 13.

<sup>54</sup> *See Ex parte* Comments of The IEEE Relay Communications Subcommittee, dated January 29, 1999, at 1

<sup>55</sup> *Id.* at 6.

<sup>56</sup> *Id.* at 6-7.

<sup>57</sup> *Id.* at 7.

<sup>58</sup> UTC maintains a database in accordance with 47 C.F.R. § 90.35 (g). This database was established in order to provide information on PLC use by utilities and also to assist in coordination with other primary uses of the 10-490 kHz band. Our analysis showed that there were approximately 430 PLC systems in operation in 400 locations in the United States in the 135.7-137.8 kHz band.

PLC use in-band, we propose technical rules that are intended to minimize any impact from these amateur station operations on unlicensed equipment use. We seek comment on this assessment.

24. While there is no international allocation to the amateur service at 135.7-137.8 kHz in the International Table of Allocations, we note that the European Posts and Telecommunications Commission ("CEPT") has allocated this band to the amateur service on a secondary basis and individual administrations are granting amateur radio operators additional technical flexibility for their LF operations. We also note that Canada has recently proposed a secondary allocation of the 135.7-137.8 kHz band for the amateur service in Region 2, which may be considered at the 2003 World Radio Conference ("WRC-03").<sup>59</sup> We believe that a domestic secondary amateur service allocation in the 135.7-137.8 kHz band would provide a chance to harmonize amateur LF allocations and promote international exploration of a common band. In the absence of an international allocation, however, we propose to adopt certain technical limitations on amateur radio operations in this band so that they should not cause interference to primary services outside of the United States. We request comment on whether there are any specific spectrum sharing concerns between amateur station operations and domestic or international primary allocation operations in the 135.7-137.8 kHz band.

25. We propose to require that amateur stations in the 135.7-137.8 kHz band meet the technical limits suggested by Canada in the WRC-03 preparatory process, noted above.<sup>60</sup> As provided in the Canadian proposal, we believe that sharing of this spectrum would be facilitated if the amateur station is limited to an EIRP of 1 W and the transmission bandwidth is limited to 100 Hz. Because of possible difficulty in measuring the EIRP of the amateur station in this frequency range, as noted by ComEd, we additionally propose to limit amateur output power in this band to 100 W PEP. We seek comment on whether these limits on EIRP and PEP are appropriate. We propose no restrictions on antenna size or design for amateur stations because such restrictions would inhibit experimentation, and we believe that interference to other users can be adequately addressed by the proposed power limitations. We also propose to limit access to this band to amateur operators holding a General, Advanced, or Amateur Extra Class license, as requested by ARRL, as a way to insure amateur operations would be conducted in a manner that minimizes the interference potential to other users. We note that with an allocation of only 2.1 kilohertz of spectrum in this band, amateur radio operations may be limited to propagation experiments, telegraphy and low speed data applications. Nonetheless, this allocation would benefit amateur experimentation of the LF range. We seek comment on all of these proposals for a secondary amateur service allocation in the 135.7-137.8 kHz.

26. In declining to propose a secondary amateur service allocation for the 160-190 kHz band, we observe that while the number of incumbent primary users in this band has decreased over the years, the record and Commission staff analysis shows that significant PLC use continues in this band in many locations.<sup>61</sup> The wider bandwidth in the 160-190 kHz band increases the number of PLC systems potentially impacted. Further, while newer technologies may be implemented where possible, PLC systems are not being replaced or retrofitted with these new technologies in many areas. Therefore, we continue to be concerned about the interference potential that a secondary amateur service allocation would have on PLC systems. We also observe that, unlike the situation with the 135.7-137.8 kHz band, there does not appear to be interest internationally in adding amateur services in the 160-190 kHz band.

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<sup>59</sup> See Document PCC.III/doc. 2171/02, Draft Proposals for the Work of the Conference WRC-03 Agenda Item 1.1, submitted by Canada, dated February 11, 2002. A copy of this document will be placed in the docket file.

<sup>60</sup> *Supra*, n. 80.

<sup>61</sup> Our analysis showed that there were approximately 4900 PLC systems in operation in 3000 locations in the United States in the 160-190 kHz band.

27. Amateur radio operations in the 160-190 kHz band under the Part 15 rules will not be affected. Under these rules, amateur operations must meet certain power and antenna length requirements, but they also are allowed to build and operate some equipment of their own design.<sup>62</sup> We thus note that amateurs do have some flexibility to achieve wideband communications and thus, the need to provide a secondary amateur service allocation in the 160-190 kHz band is reduced. We seek comment on our tentative decision to not provide the allocation in this band that ARRL requested.

28. Finally, we recognize that spectrum in both the 135.7-137.8 kHz and 160-190 kHz bands could be used more efficiently if potential operators knew where other users of the spectrum were located and could avoid them. UTC has maintained a database of PLC locations in order to notify primary Federal Government users of PLC operations. We request comment on whether this database provides sufficient information for use by amateur operators and how such access could be provided.

### III. 5250-5400 kHz BAND (RM-10209)

#### A. Background and Summary of Petition

29. Internationally, in all three ITU Regions, the band 5250-5400 kHz is allocated on a primary basis to the fixed service, and on a secondary basis to the mobile, except aeronautical mobile, service. There is currently no international amateur service allocation in this band.

30. In the United States, the 5250-5400 kHz band is allocated to the fixed service on a primary basis for Federal Government and non-Federal Government use and on a secondary basis to the mobile, except aeronautical mobile, service. In addition, footnote US340 to the U.S. Table of Frequency Allocations permits Federal and non-Federal Government maritime and aeronautical mobile stations to use bands in the 2-30 MHz region for measuring the quality of reception on radio channels on a secondary, non-interference basis; actual communication by these stations is limited to frequencies specifically allocated to these services. The band is primarily used by the United States Government for ship-to-shore and fixed point-to-point communications. There is also a limited amount of non-Federal Government use. In addition, on January 8, 1999, the Commission granted an experimental license to ARRL for 15 stations to compare communications reliability between the 3500-4000 kHz, 5100-5450 kHz and 7000-7300 kHz bands.<sup>63</sup>

31. On July 24, 2001, ARRL filed a *Petition for Rule Making*<sup>64</sup> (“5000 kHz Petition”) requesting that we amend Parts 2 and 97 of our Rules to create a domestic secondary amateur service allocation in the 5250-5400 kHz band.<sup>65</sup> ARRL claims that there is a current need for 150 kilohertz of usable spectrum around 5000 kHz for the amateur service, and that this action is needed to fill the ionospheric propagation gap between the propagation paths provided by the amateur service allocations in the 3500-4000 kHz and 7000-7300 kHz bands.<sup>66</sup> ARRL claims that there are times when the existing

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<sup>62</sup> See 47 C.F.R. § 15.23 (the rule allows for an amateur to construct no more than five home-built devices that are not marketed or not constructed from a kit).

<sup>63</sup> File number 6206-EX-PL-1998, call sign WA2XSY.

<sup>64</sup> See *Petition For Rule Making*, RM-10209, Public Notice (rel. Aug. 13, 2001) Report No. 2501.

<sup>65</sup> The 5000 kHz Petition specifically requests amendment of 47 CFR §§ 2.106; 97.13(c)(1); 97.301(b), (c), and (d); 97.303, and 97.305.

<sup>66</sup> HF communications rely on the electric charging (ionization) of the ionosphere (atmospheric altitudes between 50-500 km) to refract the radio signal back to Earth. This charging is caused when the sun’s radiation collides with uncharged atoms in the Earth’s atmosphere, producing free electrons which affect the frequencies that will be refracted. The ionosphere varies with the solar cycle, the seasons, and the time of day and thus, the frequencies that are refracted vary correspondingly. Frequencies which

amateur service allocations in the 3500-4000 kHz and 7000-7300 kHz bands do not provide reliable communications due to solar cycles, and seasonal and daily variations in the ionosphere.<sup>67</sup> ARRL also states that an allocation in the 5000 kHz range would provide optimum propagation conditions on occasions when ionospheric conditions do not permit the use of other frequency bands. For example, it states that during the summer months, frequencies in the 3500 kHz band have excessive atmospheric noise for the transmitter power used, while the 7000 kHz band may penetrate the ionosphere.<sup>68</sup> ARRL further claims that this “propagation gap” occasionally interrupts emergency communications by amateur radio operators between the U.S. and the Caribbean islands during hurricanes and severe weather disasters.<sup>69</sup> Further, ARRL argues that amateur stations use relatively low power and increasingly use digital modulation requiring low multipath delay, so that operating frequencies should be chosen near the maximum usable frequency for the desired path and time. It also argues that an allocation in the 5000 kHz range would relieve what is periodically substantial overcrowding of the 3500 kHz and 7000 kHz bands.

32. The ARRL submits that the experimental operations authorized by the Commission in 1999, and modified in 2000, show that amateur stations can co-exist with incumbent operations without causing harmful interference.<sup>70</sup> Additionally, based upon the results of its own tests and computer analyses authorized under this experimental assignment, ARRL asserts that propagation in the 5000 kHz band is predicted to be more stable near sunrise and sunset for amateur radio communications, while the 7000 kHz band is better at night and the 3500 kHz band is better during the day. Further, ARRL points out that the noise level at 3500 kHz is higher than in the 5000 kHz or 7000 kHz bands, which degrades the signal level and performance.<sup>71</sup>

33. ARRL notes that the U.S. Department of Commerce (“DOC”) published several spectrum requirements reports that support this new amateur requirement.<sup>72</sup> Additionally, it contends that the International Amateur Radio Union has established a requirement for a narrow allocation near 5000 kHz to account for changes in propagation conditions. It also submits that there are pending proposals for an amateur allocation around 5000 kHz in Europe. For example, it indicates that the United Kingdom is studying the 5245-5445 kHz band to address propagation, noise and congestion problems for amateur HF communications.<sup>73</sup>

(Continued from previous page) \_\_\_\_\_

provide reliable communication at one time may not do so a short time later. There are times when the 3500-4000 kHz band is too low and the 7000-7300 kHz is too high for reliable communication. If the frequency is too high, the wave will penetrate the ionosphere and not be refracted; if it is too low, the signal may be absorbed by the atmosphere. *See 5000 kHz Petition* at 1-2

<sup>67</sup> *See 5000 kHz Petition* (RM-10209) at 2.

<sup>68</sup> *Id.*

<sup>69</sup> *Id.* at 2. ARRL also contends that experimental tests in the 5200 kHz band have been successful in providing a communications path between the U.S. and Caribbean countries.

<sup>70</sup> *Id.* at 6.

<sup>71</sup> *Id.* at 16.

<sup>72</sup> *See* Department of Commerce, *U.S. National Spectrum Requirements: Projections and Trends*, NITA Special Publication 94-31, March 1995. *See also* Department of Commerce, *High Frequency Spectrum Planning Options*, NTIA Special Publication 96-332, November 1996. ARRL contends that while the DOC reports focused on the 4945-4995 kHz band, it was only to illustrate that an allocation around 5000 kHz is needed.

<sup>73</sup> *See 5000 kHz Petition*, at 5-6.

34. ARRL argues that the trend for incumbent 5000 kHz fixed service operations is to migrate to alternative technologies such as microwave, satellite and fiber for long haul communications.<sup>74</sup> It therefore believes that this band should become increasingly available for amateur radio use. ARRL indicates that the 5250-5400 kHz segment is the least encumbered portion of the 5100-5450 kHz band. ARRL also claims that the low utilization of this band by Federal Government operators would permit the amateur stations to dynamically select frequencies to avoid interference to primary services, and that such dynamic frequency selection has been demonstrated at 10 MHz.<sup>75</sup> Further, ARRL asserts that since the Commission authorized ARRL to conduct experimental operations in this band in 1999, there have been no reports of interference attributable to amateur operations.<sup>76</sup> Finally, ARRL proposes that the technical rules for this band be similar to the rules for the 3500 kHz and 7000 kHz bands, i.e., output power be limited to 1500 watts PEP with the entire band limited to RTTY, data, phone and image emission types.<sup>77</sup>

## B. Comments

35. Eighty-seven parties filed comments to the *5000 kHz Petition*; eighty-five of which support the request.<sup>78</sup> While not stating that he opposes the ARRL petition, Taylor indicates that the Commission should carefully investigate the allegation that propagation on 3500 kHz and 7000 kHz does not provide adequate coverage.<sup>79</sup> Similarly, Grant asserts that amateur radio operators should more efficiently manage their operations, and could thereby alleviate any interference or overcrowding problems in the existing 3500 kHz or 7000 kHz bands.<sup>80</sup>

36. Some comments suggest power limits for amateur stations in the 5000 kHz band. Allen states that he does not support the use of 1500 Watts PEP, because of the costs associated with buying high-powered equipment and the need for a level playing field between those who can and those who cannot afford to buy the high-powered systems.<sup>81</sup> Ponsness and Perkins suggest that output power should be limited to 200 watts PEP to prevent interference to other services.<sup>82</sup> Gustafson suggests a power limit of 250 Watts PEP.<sup>83</sup> The parties did not provide analytical support or studies regarding their suggested power limits.

37. Some comments propose that this band be subdivided to allow digital, wide-band and CW<sup>84</sup> communications. Ellis states that the band 5250-5275 kHz should be used for CW, the band 5275-

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<sup>74</sup> See Department of Commerce, *U.S. National Spectrum Requirements: Projections and Trends*, NITA Special Publication 94-31, March 1995.

<sup>75</sup> *Id.* at 3.

<sup>76</sup> *Id.* at 6.

<sup>77</sup> *Id.* at 17. The report on ARRL's experimental operation is contained within Annex 2 of the *5000 kHz Petition*, starting at page 15.

<sup>78</sup> Commenters are listed in Appendix B.

<sup>79</sup> See Comments of Taylor at 1.

<sup>80</sup> See Comments of Grant at 1.

<sup>81</sup> See Comments of Allen at 1.

<sup>82</sup> See Comments of Ponsness at 1 and Perkins at 1, respectively.

<sup>83</sup> See Comments of Gustafson at 1.

<sup>84</sup> See footnote 17, *supra*.

5325 kHz for digital and the rest for wide-band signals such as single-sideband (“SSB”)<sup>85</sup> communications.<sup>86</sup> DeCaria suggests that the lowest 75 kilohertz of the band be used for digital because of the incompatibility between SSB and digital signals.<sup>87</sup> McVey proposes that the lowest 25 kilohertz of the band be set aside for CW and digital modes of communication because of the incompatibility between SSB and these signals.<sup>88</sup> Koles suggests that 5250-5300 kHz band be used for CW/digital modes and the rest for SSB.<sup>89</sup> Tannehill and Gustafson do not believe that sub-banding is necessary. Tannehill prefers to rely on good practice to keep the communications modes separate, while Gustafson states that sub-banding will hamper future technical development.<sup>90</sup>

### C. Proposal

38. We agree with ARRL that propagation and interference conditions in the 3500 kHz and 7000 kHz bands could hinder effective amateur HF communications. In particular, as ARRL indicates, the nature of the ionosphere prevents communications during certain portions of the day because of increased atmospheric noise levels at certain times on certain frequencies, or decreased ionization allows the transmission to penetrate the ionosphere at other times and frequencies. ARRL’s experimentation appears to support its contention that the 5000 kHz frequency band can be effective in supporting communication when the 3500 kHz and 7000 kHz bands are not. As pointed out by Taylor, the primary allocation to broadcasting in Europe and parts of Asia hinders certain amateur operations in two-thirds of the 7000 kHz band in the evenings. However, while amateur radio use of the 7000 kHz band is on a primary basis in ITU Region 2, footnote S5.142 indicates that the amateur service cannot impose constraints on the broadcasting services in Regions 1 and 3, and thus must operate around the primary users.<sup>91</sup> A new allocation in the 5000 kHz frequency range would permit amateur service operations when other bands cannot be used. Therefore, we tentatively conclude that the amateur service would benefit from a secondary allocation in the 5250-5400 kHz band and propose to establish such an allocation. We request comment on this proposal.

39. It appears that amateur radio operators should be able to avoid interference to primary operations in this band due to the limited numbers of primary assignments<sup>92</sup> which are authorized for operation in the 5250-5400 kHz band, and their experience in sharing HF frequencies in other bands. The operational protocol of “listen before transmit” employed by amateur radio operators should further minimize interference. We note that currently this technique is not explicitly required by our Rules and we request comment on whether it should be explicitly stated in the Rules in order to protect the primary operators in the 5250-5400 kHz band. We propose to limit the output power of the amateur stations to 1500 W PEP as requested by ARRL. Further, we invite comments as to whether the 5250-5400 kHz band should be restricted to Amateur radio operators with an Amateur Extra Class license to better ensure compatible sharing with the Federal Government operations, or could the band also be made available to

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<sup>85</sup> Single-sideband signals are amplitude-modulated signals where only one of the sidebands is transmitted.

<sup>86</sup> See Comments of Ellis at 1.

<sup>87</sup> See Comments of DeCaria at 1.

<sup>88</sup> See Comments of McVey at 1.

<sup>89</sup> See Comments of Koles at 1.

<sup>90</sup> See Comments of Tannehill at 1 and Gustafson at 1, respectively.

<sup>91</sup> Europe is in ITU-R Region 1 and Asia is in ITU-R Region 3.

<sup>92</sup> A search of the Government Master File and the Commission’s license databases in this band in January 2002 found a total of 757 assignments. Twenty-six of those assignments are non-Federal Government.

operators with a General or Advanced Class license just as in the 10,100-10,150 kHz band (30 meter band).<sup>93</sup> We invite comment on whether the power limit and operator license requirement are sufficient to prevent interference to primary users, and whether an EIRP limit would also be appropriate for this frequency band. We also invite comment on other means that will reduce potential interference.

40. The *5000 kHz Petition* does not discuss sub-banding and ARRL's suggested rules would allow all emission types to use the entire band.<sup>94</sup> We note that several commenters suggest that sub-banding would be useful. We further note that Section 97.305 of our Rules segregates digital modes from other amateur station emission modes in the 3500 kHz and 7000 kHz bands to protect narrow band emissions like data from wider emissions like single-side band voice.<sup>95</sup> We request comment on whether sub-banding is necessary and/or appropriate for the 5000 kHz band as well.

#### IV. 2400-2402 MHz BAND (RM-9949)

##### A. Background and Summary of Petition

41. Internationally, in all three ITU Regions, the band 2300-2450 MHz is allocated on a co-primary basis to the fixed and mobile services and on a secondary basis to the amateur service. In addition, this band is allocated to the radiolocation service on a co-primary basis in ITU Regions 2 and 3, and on a secondary basis in Region 1. Further, in all three ITU Regions, industrial, scientific and medical ("ISM") devices operate in the 2400-2500 MHz band and other radiocommunication services operating in this band must accept interference caused by ISM devices.<sup>96</sup> The amateur-satellite service is also permitted in the 2400-2450 MHz band on a non-harmful interference basis and administrations must ensure that any harmful interference created by amateur-satellite operations is eliminated.<sup>97</sup> In the United States, unlicensed Part 15 transmitting devices are also permitted in the 2400-2483 MHz band on a non-harmful interference basis.<sup>98</sup> These devices are used for a variety of operations including cordless phones, wireless local area networks, and other broadband wireless applications using industry standards protocols such as IEEE 802.11b and Bluetooth.<sup>99</sup>

42. Prior to August 10, 1995, the 2400-2402 MHz band was allocated domestically to Federal Government radiolocation operations<sup>100</sup> on a primary basis and to the amateur service on a secondary basis with amateur-satellite operations permitted on a non-harmful interference basis.

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<sup>93</sup> See 47 C.F.R. §97.303(d).

<sup>94</sup> See *5000 kHz Petition* at 19.

<sup>95</sup> See 47 C.F.R. § 97.305.

<sup>96</sup> See 47 C.F.R. § 2.106 footnote S5.150. ISM devices are equipment or application designed to generate and use locally RF energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunication. Typical ISM applications are the production of physical, biological, or chemical effects such as heating, ionization of gases, mechanical vibrations, hair removal and acceleration of charged particles. See also 47 C.F.R. §18.107.

<sup>97</sup> See 47 C.F.R. §2.106 footnote S5.282.

<sup>98</sup> See 47 C.F.R. §15.247(b)(1), which permits higher-powered operations in this frequency band for spread spectrum transmitters.

<sup>99</sup> See 47 C.F.R. §§15.24 and 15.249.

<sup>100</sup> The Federal-Government allocation was used, to a limited extent, by the military for radar testing systems such as target scattering and enemy radar simulators. See NTIA, Spectrum Reallocation Final Report, NTIA Special Publication 95-32 (rel. Feb. 1995).

However, pursuant to the Omnibus Budget Reconciliation Act of 1993 (“OBRA-93”),<sup>101</sup> the National Telecommunications and Information Administration (“NTIA”) identified the 2390-2417 MHz band for transfer from shared use to exclusive non-Federal Government use spectrum.<sup>102</sup> ISM operations are also permitted throughout the 2400-2500 MHz band within the United States under the provisions of footnote S5.150 to the Table of Frequency Allocations and Part 18 of the Commission’s rules. Currently, the amateur service remains on a secondary basis with ISM operations and the amateur-satellite service on a non-harmful interference basis. Any Federal Government operations in the 2400-2402 MHz band after August 10, 1995, are on a non-interference basis to non-Federal Government uses.<sup>103</sup>

43. On November 18, 1999, the Commission adopted a *Policy Statement* to set forth guiding principles for its spectrum management activities for the new millennium.<sup>104</sup> In considering the bands transferred from Federal Government use, the *Policy Statement* concluded that the 2400-2402 MHz band should be placed into a spectrum reserve for future applications. Specifically, the *Policy Statement* indicated that existing ISM and unlicensed usage of the band would restrict new services given current spectrum sharing techniques. Therefore, the band would be reserved until new technologies or other changes would increase the opportunity for new operations and that the Commission would be receptive to petitions for reallocation of the reserved bands.

44. In response to the *Policy Statement*, the ARRL filed the subject *Petition for Rule Making*<sup>105</sup> (“2400 MHz Petition”) on July 17, 2000, requesting that we amend Sections 2.106 and 97.303(j) (2) of our Rules to upgrade the domestic allocation of the amateur radio service in the 2400-2402 MHz band from secondary status to primary status and add a primary allocation for the amateur-satellite service.<sup>106</sup> ARRL states that such an action would ensure continued unfettered access to the 2400-2402 MHz band by the amateur service.<sup>107</sup>

45. In support of its request, ARRL indicates that a primary allocation to the amateur service would protect its operations from reallocation or use by an incompatible sharing partner. ARRL states that amateur radio operators use this band for both analog and digital satellite uplink and downlink operations.<sup>108</sup> ARRL argues that the amateur-satellite service currently operates in the 2400-2450 MHz band on a non-harmful interference, non-protected basis, principally for engineering beacon operations.<sup>109</sup> ARRL submits that primary allocation status in this range will sustain the overwhelming costs and dedication of time and effort required to keep the amateur-satellite program flourishing, and provide some

<sup>101</sup> See OBRA-93, § 6001(a) (codified at 47 U.S.C. § 923(a)-(b)).

<sup>102</sup> In doing so, NTIA took note of the Congressional requirement that amateur operations were to be minimally disrupted by the reallocations. See *NTIA Spectrum Reallocation Final Report*, NTIA Special Report 95-32, February 1995, at 4-30.

<sup>103</sup> See 47 C.F.R. §2.106 footnote G123.

<sup>104</sup> See *Policy Statement*, FCC 99-354, 14 FCC Rcd 19868 (1999).

<sup>105</sup> See *Petition for Rule Making*, RM-9949, Public Notice (rel. Aug. 30, 2000) Report No. 2433.

<sup>106</sup> See 47 C.F.R. §§2.106 and 97.303(j)(2).

<sup>107</sup> See *2400 MHz Petition* at 4-5.

<sup>108</sup> See *2400 MHz Petition* at 7.

<sup>109</sup> A beacon is an amateur station transmitting communications for the purposes of observation of propagation and reception or other related experimental activities. See 47 C.F.R. § 97.3 (a) (9). Operation of a beacon station is permitted as specified in 47 C.F.R. § 97.203. ARRL also lists the following satellite operations that use the 2400-2402 MHz segment: UoSAT-OSCAR 9, AMSAT-OSCAR 13, PACSAT-OSCAR 16, DOVE-OSCAR 17, and AMSAT-P3D. See *Amateur Spacecraft Statistics Chart* in the ARRL Radio Amateur’s Satellite Handbook, at Appendix A, pages 1-6.



assurances of future occupancy of the band for the next generation of amateur satellites.<sup>110</sup> Further, the amateur service community indicates that the 2400-2402 MHz band is needed for broadband analog and digital applications on its Phase 3D satellite.<sup>111</sup>

46. ARRL contends that upgrading the amateur and amateur-satellite service allocations in this band would not impose constraints on co-frequency Part 15 and Part 18 devices because this band is located at the lower edge of the segment in which such devices operate, and because of the geographic separation typically encountered between amateur-satellite stations and Part 15 and Part 18 devices.

## B. Comments

47. Four parties filed comments to the ARRL *2400 MHz Petition*, all supporting its requests.<sup>112</sup> Whedbee states that the amateur radio service has been a long-standing contributor to state-of-the-art telecommunications technology and currently has numerous amateur-satellite service facilities operating in the band 2400-2402 MHz. Murray states that granting ARRL's *2400 MHz Petition* would be of great benefit to amateur radio operators around the world, who have collectively expended substantial amounts of money, time, and effort to design, build, and launch amateur radio satellites. Murray further states that the requested upgrade of the amateur-satellite service to primary status would protect the significant investments made to date, and would also eliminate concerns within the amateur service community that the spectrum may be reallocated and/or assigned to an incompatible use.<sup>113</sup>

48. The Radio Amateur Satellite Corporation ("AMSAT") indicates that the Phase 3D satellite was built mostly by volunteers from a number of countries at a cost of approximately \$4 million.<sup>114</sup> This satellite carries a group of broadband receivers that operate in various bands available to the amateur-satellite service from 21 MHz to 5.7 GHz and broadband linear transmitters that operate in various amateur-satellite service bands from 144 MHz to 24 GHz. Two of Phase 3D's satellite transmitters are in the band 2400-2402 MHz, as is one of its receivers. AMSAT states that these transmitters and receivers will be heavily used.<sup>115</sup>

## C. Proposal

49. We believe that ARRL's request to upgrade the allocation status of the amateur and amateur-satellite services in the 2400-2402 MHz band has merit. As noted above, the Commission placed this spectrum into a reserve for future development because existing ISM and unlicensed operations created a spectral environment that would be difficult to share with other operations. Nevertheless, the amateur service community has succeeded in sharing this spectrum. Further, we acknowledge the amateur service community's position that it has invested time, effort and money in the development of the amateur and amateur satellite services and primary allocations in this band would protect this investment from future allocation requests in the band. Accordingly, we propose to upgrade the

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<sup>110</sup> See *2400 MHz Petition* at 10.

<sup>111</sup> See Radio Amateur Satellite Corporation ("AMSAT") Comments at 2 and Murray Comments at 2. The Phase 3D satellite will use various amateur bands between 21 MHz and 5.7 GHz. The spacecraft was built by volunteers from a number of countries at a cost of approximately \$4 million dollars.

<sup>112</sup> A list of these commenters is presented in Appendix C.

<sup>113</sup> See Comments of Murray at 2.

<sup>114</sup> See Comments of AMSAT at 2. The spacecraft was launched on November 16, 2000.

<sup>115</sup> *Id.*

allocation for the amateur service from secondary status to primary status and to add a primary allocation to the amateur-satellite service in the 2400-2402 MHz band in Parts 2 and 97 of our Rules. We also note that footnote S5.282 of the International Table of Allocations states that “the amateur-satellite service may operate subject to not causing harmful interference to other services operating in accordance with the Table [of Allocations].”<sup>116</sup> Therefore, amateur-satellite operators will not be exempted from this requirement to protect operations of other services outside of the United States.

50. While primary allocations for the amateur and amateur-satellite services may guard against introducing other incompatible users in the band, this allocation change would not alter the status of amateur and amateur-satellite services use vis-à-vis incumbent uses of the band. Either a primary or secondary allocation in ISM bands must accept interference from, and not hinder the use of, ISM equipment.<sup>117</sup> Similarly, this band is extensively used by unlicensed operations, which have been able to share with amateur radio station use to this point. Because this band is important to unlicensed applications and there is widespread deployment, the removal of such devices would not be feasible. We request comment on whether the proposed primary amateur and amateur-satellite service allocations would conflict with unlicensed use of the band.

51. In the discussion above, we are merely proposing to change the allocation status of the amateur service operations in the 2400-2402 MHz band. We do not believe that the service rules or operational requirements of the services in this band require modification. We request comment on this proposal.

## **V. PROCEDURAL MATTERS**

### **A. Initial Regulatory Flexibility Analysis**

52. As required by Section 603 of the Regulatory Flexibility Act, 5 U.S.C. § 603, the Commission has prepared an Initial Regulatory Flexibility Certification the possible significant economic impact of the proposals contained in this document on a substantial number of small entities. This certification declares that there is no significant economic impact on small entities because the amateur radio operators are individuals precluded from using this spectrum for commercial purposes, and therefore do not fit the definition of a small entity. In addition, the rules proposed simply make additional spectrum available to the amateur radio service and do not impose any additional fees, costs, or compliance burdens on an amateur radio operator. The Certification is set forth in Appendix D.

### **B. Ex Parte Rules - - Permit-But-Disclose Proceeding**

53. This is a permit-but-disclose notice and comment rule making proceeding. *Ex parte* presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in the Commission's rules. *See generally* 47 C.F.R. §§ 1.1202, 1.1203, and 1.2306(a).

### **C. Comments**

54. Pursuant to Sections 1.415 and 1.419 of the Commission's rules, 47 C.F.R. §§ 1.415 and 1.419, interested parties may file comments on or before [45 days from date of publication in the Federal Register] and reply comments on or before [60 days from date of publication in the Federal Register]. Comments may be filed using the Commission's Electronic Comment Filing System ("ECFS"),

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<sup>116</sup> See 47 C.F.R. §2.106 footnote S5.282.

<sup>117</sup> See 47 C.F.R. §2.106, footnote S5.150.

<http://www.fcc.gov/e-file/ecfs.html>, or by filing paper copies. See *Electronic Filing of Documents in Rulemaking Proceedings*, 63 Fed. Reg. 23,121 (1998).

55. Comments filed through the ECFS can be sent as an electronic file via the Internet to <http://www.fcc.gov/e-file/ecfs.html>. Generally, only one copy of an electronic submission must be filed. If multiple docket or rulemaking numbers appear in the caption of this proceeding, however, commenters must transmit one electronic copy of the comments to each docket or rulemaking number referenced in the caption. In completing the transmittal screen, commenters should include their full name, U.S. Postal Service mailing address, and the applicable docket or rulemaking number. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail comments, commenters should send an e-mail to [ecfs@fcc.gov](mailto:ecfs@fcc.gov), and should include the following words in the body of the message, "get form <your e-mail address.>" A sample form and directions will be sent in reply. Parties who choose to file by paper must file an original and four copies of each filing. If more than one docket or rulemaking number appear in the caption of this proceeding, commenters must submit two additional copies for each additional docket or rulemaking number.

56. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail (although we continue to experience delays in receiving U.S. Postal Service mail). The Commission's contractor, Vistrionix, Inc., will receive hand-delivered or messenger-delivered paper filings for the Commission's Secretary at 236 Massachusetts Avenue, N.E., Suite 110, Washington, D.C. 20002. The filing hours at this location are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building. Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743. U.S. Postal Service first-class mail, Express Mail, and Priority Mail should be addressed to 445 12th Street, SW, Washington, D.C. 20554. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

57. Parties who choose to file by paper should also submit their comments on diskette. Such a submission should be on a 3.5-inch diskette formatted in an IBM compatible format using Microsoft Word or compatible software. The diskette should be accompanied by a cover letter and should be submitted in "read only" mode. The diskette should be clearly labeled with the commenter's name, proceeding (including the lead docket number, type of pleading (comment or reply comment), date of submission, and the name of the electronic file on the diskette. The label should also include the following phrase "Disk Copy – Not an Original." Each diskette should contain only party's pleading, preferably in a single electronic file. In addition, commenters must send diskette copies to the Commission's copy contractor, Qualex International, Portals II, 445 12th Street, SW, Room CY-B402, Washington, DC, 20554.

58. Alternative formats (computer diskette, large print, audio cassette and Braille) are available to persons with disabilities by contacting Brian Millin at (202) 418-7426, TTY (202) 418-2555, or via e-mail to [bmillin@fcc.gov](mailto:bmillin@fcc.gov). This *Notice* can also be downloaded at <http://www.fcc.gov/oet>.

59. *Paperwork Reduction Act Comments.* Written comments by the public on the proposed and/or modified information collections are due on or before [30 days from date of publication in the Federal Register]. Written comments must be submitted by the OMB on the proposed and/or modified information collections on or before [60 days after date of publication in the Federal Register.] In addition to filing comments with the Acting Secretary, a copy of any comments on the information collection(s) contained herein should be submitted to Judy Boley, Federal Communications Commission, Room 1-C804, 445 12th Street, SW, Washington, DC 20554, or via the Internet to [jboley@fcc.gov](mailto:jboley@fcc.gov) and to Jeanette Thornton, OMB Desk Officer, Room 10236, 725 17th Street, NW, Washington, DC 20503 or via the Internet to [JThornton@omb.eop.gov](mailto:JThornton@omb.eop.gov).

**D. Contact Person**

60. For further information regarding this *Notice*, contact Kathryn Medley, Office of Engineering and Technology, (202) 418-1211, e-mail [kmedley@fcc.gov](mailto:kmedley@fcc.gov).

**VI. ORDERING CLAUSES**

61. Accordingly, IT IS FURTHER ORDERED that pursuant to Sections 1, 4, 301, 302(a), 303, 307, 309, 316, 332, 334, and 336 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 151, 154, 301, 302(a), 303, 307, 309, 316, 332, 334, and 336, the NOTICE OF PROPOSED RULE MAKING AND ORDER is hereby ADOPTED.

62. IT IS ALSO ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this NOTICE OF PROPOSED RULE MAKING, including the Initial Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration in accordance with Section 603(a) of the Regulatory Flexibility Act.<sup>118</sup>

63. IT IS FURTHER ORDERED that the MOTION TO STRIKE filed by ARRL IS DENIED.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch  
Secretary

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<sup>118</sup> See 5 U.S.C. § 603(a).

**APPENDIX A: List of Commenting Parties on the *LF Petition***

1. ARRL
2. Alabama Power, *et al.*
3. Robert J. Albanese
4. Brian C. Alexander
5. William E. Bowers
6. Richard G. Brunner
7. Commonwealth Edison Company
8. Steve Cook
9. Paul R. Drum
10. Collin Dvorak
11. Richard Eyre-Eagles
12. Ed Fernandez
13. Florida Reliability Coordinating Council
14. Philip E. Galasso
15. HID Corporation
16. Scott Holmes
17. IEEE Relay Committee/Mark Simon
18. Kellee Jones
19. Nickolaus E. Leggett
20. Michael J. McDonald
21. Dr. Jeffrey Paterson
22. Les Rayburn
23. Michael J. Reid
24. Lacy L. Rice, Jr.
25. Bob Ryan
26. Paul R. Signorelli
27. Mark Simon
28. Southeastern Electric Reliability Council
29. Texas Instruments
30. UTC
31. James E. Whedbee
32. James Edwin Whedbee

APPENDIX B: List of Commenting Parties on the *5000 kHz Petition*

1. ARRL
2. Brian Allen
3. Dave Armbrust
4. Perry D. Ballinger
5. William Bishop
6. Stanley J. Briggs
7. Jerry Brooks
8. Michael Brooks
9. Skip Cameron
10. Damon Cassell
11. James M. Cordes
12. Thomas P. Cloyes
13. Dr. Anthony R. Curtis
14. William L. D'Agostino
15. Jack Daane
16. Don B. DeCaria
17. Josseph P. deFulgentiis
18. David W. Duke
19. Mark J. Dulcey
20. John J. Ellis
21. Jack Falkenhof
22. Jeffrey D. Fontaine
23. Larry R. Fravel
24. Steven J. Friis
25. Arthur S. Garibay
26. David E. Gilbert
27. Mark R. Gilbert
28. Richard Grant
29. Eric Gustafson
30. Gregory Hendry
31. Scott D. Holland
32. James Hughes
33. Richard Illman
34. Ronald J. Jakubowski
35. Clare Jarvis
36. David M. Jolley
37. Robert L. Kaster, Jr.
38. Richard H. Keith
39. Christopher Kent
40. Nathan Kirshman
41. Joost Koenig
42. Stephanie R. Koles
43. Richard A. Knox
44. Robert K. Leef
45. Nickolaus E. Leggett
46. Ivan McCaffrey
47. W. Lee McVey
48. Hugh C. Maddocks
49. Michael Maiorana
50. C.R. Malphrus
51. Josh Martin
52. Patrick A. Martini
53. Carol M. Mellard
54. Dr. Richard A. Meznarich
55. P.B. Middlebrook III
56. Richard Miller
57. Jack Mitchell
58. M. Dwayne Moffett
59. Amedeo F. Moretti
60. Charles Morris
61. Greg Mummley
62. Edward Murphy
63. Mike Murray
64. Neil J. Nitzberg
65. James O'Brien III
66. Gary E. Perkins
67. George J. Peters
68. Theodore K. Phelps
69. Dennis J. Posness
70. Markus B. Powell
71. Malcom M. Preston
72. Brennan Price
73. J.P. Riegel, III
74. Bob Roehrig
75. Gary W. Sanders
76. Stephen J. Schrack
77. Ken Slauson
78. Tony A. Stone
79. Richard L. Tannehill
80. Harold Tate
81. Dr. Noel A. Taylor
82. Paul J. Toth
83. Charles R. Wallace
84. Richard M. Winter
85. Edward J. Wirtz
86. John Fox Worthington
87. Kyle A. Yoksh

**APPENDIX C: List of Commenting Parties on the *2400 MHz Petition***

1. David A. Heupel
2. Gerald Murray
3. James Edwin Whedbee
4. ARRL
5. Radio Amateur Satellite Corporation

**APPENDIX D: Initial Regulatory Flexibility Certification**

1. *Initial Regulatory Flexibility Certification.* The Regulatory Flexibility Act of 1980, as amended (RFA),<sup>119</sup> requires that an initial regulatory flexibility analysis be prepared for notice and comment rule making proceedings, unless the agency certifies that “the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.”<sup>120</sup> The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”<sup>121</sup> In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.<sup>122</sup> A “small business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).<sup>123</sup>

2. In this *Notice*, we propose to make available two additional frequency bands on a secondary basis and upgrade the allocation of a third frequency band to the amateur service. The amateur radio service is a voluntary non-commercial communication service comprised of individuals or groups of individuals holding amateur radio licenses issued by the Commission.<sup>124</sup> These individuals are prohibited from using spectrum allocated to the amateur service for communications for hire or for material compensation, or for communications in which the amateur radio operator has a pecuniary interest.<sup>125</sup> Therefore, amateur radio operators do not fit any part of the definition of “small entities” described above, and thus are not classified as such.

3. In addition, even if the amateur radio licensees were hypothetically considered as “small entities,” the rule changes proposed in this *Notice* simply make spectrum available for the amateur radio operations and impose no additional fees, costs, or compliance burdens on an operator. Since the amateur radio service is a voluntary service, it would be up to each individual amateur to purchase or modify equipment to use the new bands. There is no cost associated with the upgrade of the allocation. On the contrary, the amateur radio service receives the positive benefits of access to additional spectrum.

4. Therefore, we certify that the proposals in this *Notice*, if adopted, will not have a significant economic impact on a substantial number of small entities. The Commission will send a copy of the *Notice*, including a copy of this Initial Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the SBA.<sup>126</sup> This initial certification will also be published in the Federal Register.<sup>127</sup>

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<sup>119</sup> See 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601– 612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

<sup>120</sup> 5 U.S.C. § 605(b).

<sup>121</sup> 5 U.S.C. § 601(6).

<sup>122</sup> 5 U.S.C. § 601(3) (incorporating by reference the definition of “small business concern” in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.”

<sup>123</sup> 15 U.S.C. § 632.

<sup>124</sup> See 47 CFR §§97.1 and 97.3(a).

<sup>125</sup> See 47 CFR §§97.113(a)(2).

<sup>126</sup> 5 U.S.C. § 605(b).

<sup>127</sup> 5 U.S.C. § 605(b).



**APPENDIX E: Proposed Rules**

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR Parts 2 and 97 as follows:

**PART 2 -- FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS**

1. The authority citation for Part 2 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended as follows:

- a. Revise pages 3, 11, and 51 of the “camera-ready” copy of the table.
- b. In the list of United States footnotes, add footnote USxxx.

The additions and revisions read as follows:

**§ 2.106 Table of Frequency Allocations.**

\* \* \* \* \*

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
129-130 FIXED MARITIME MOBILE RADIONAVIGATION S5.60 5.64	See previous page for 110-130 kHz	129-130 FIXED MARITIME MOBILE RADIONAVIGATION S5.60 5.64	See previous page for 110-130 kHz		See previous page for 110-130 kHz
130-148.5 FIXED MARITIME MOBILE 5.64 5.67	130-160 FIXED MARITIME MOBILE	130-160 FIXED MARITIME MOBILE RADIONAVIGATION	130-160 FIXED MARITIME MOBILE		International Fixed (23) Maritime (80) Amateur (97)
148.5-255 BROADCASTING   5.68 5.69 5.70 255-283.5 BROADCASTING AERONAUTICAL RADIONAVIGATION 5.70 5.71 283.5-315 AERONAUTICAL RADIONAVIGATION MARITIME RADIONAVIGATION (radiobeacons) 5.73  5.72 5.74	5.64	5.64	5.64 US294 USxxx		
	160-190 FIXED	160-190 FIXED Aeronautical radionavigation	160-190 FIXED MARITIME MOBILE 459 US294	160-190 FIXED	International Fixed (23)
	190-200 AERONAUTICAL RADIONAVIGATION		190-200 AERONAUTICAL RADIONAVIGATION US18 US226 US294		Aviation (87)
	200-275 AERONAUTICAL RADIONAVIGATION Aeronautical mobile	200-285 AERONAUTICAL RADIONAVIGATION Aeronautical mobile	200-275 AERONAUTICAL RADIONAVIGATION US18 Aeronautical mobile  US294		
	275-285 AERONAUTICAL RADIONAVIGATION Aeronautical mobile Maritime radionavigation (radiobeacons)		275-285 AERONAUTICAL RADIONAVIGATION Aeronautical mobile Maritime radionavigation (radiobeacons)  US18 US294		
	285-315 AERONAUTICAL RADIONAVIGATION MARITIME RADIONAVIGATION (radiobeacons) 5.73		285-325 MARITIME RADIONAVIGATION (radiobeacons) 5.73 Aeronautical radionavigation (radiobeacons)		

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
5060-5250 FIXED Mobile except aeronautical mobile 5.133			5060-5450 FIXED Mobile except aeronautical mobile		Maritime (80) Aviation (87) Private Land Mobile (90) Amateur (97)
5250-5450 FIXED MOBILE except aeronautical mobile			US212 US340 USxxx		
5450-5480 FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE	5450-5480 AERONAUTICAL MOBILE (R)	5450-5480 FIXED AERONAUTICAL MOBILE (OR) LAND MOBILE	5450-5680 AERONAUTICAL MOBILE (R)		Aviation (87)
5480-5680 AERONAUTICAL MOBILE (R)  5.111 5.115			5.111 5.115 US283 US340		
5680-5730 AERONAUTICAL MOBILE (OR)  5.111 5.115			5680-5730 AERONAUTICAL MOBILE (OR)  5.111 5.115 US340		International Fixed (23) Maritime (80) Aviation (87)
5730-5900 FIXED LAND MOBILE	5730-5900 FIXED MOBILE except aeronautical mobile (R)	5730-5900 FIXED Mobile except aeronautical mobile (R)	5730-5950 FIXED MOBILE except aeronautical mobile (R)		
5900-5950 BROADCASTING S5.134   5.136			US340		
5950-6200 BROADCASTING			5950-6200 BROADCASTING US340		
6200-6525 MARITIME MOBILE 5.109 5.110 5.130 5.132 5.137			6200-6525 MARITIME MOBILE S5.109 S5.110 S5.130 S5.132 US82 US296 US340		Maritime (80)
6525-6685 AERONAUTICAL MOBILE (R)			6525-6685 AERONAUTICAL MOBILE (R)  US283 US340		Aviation (87)

International Table			United States Table		FCC Rule Part(s)
Region 1	Region 2	Region 3	Federal Government	Non-Federal Government	
See previous page for 2300-2450 MHz			See previous page for 2310-2360 MHz	2345-2360 FIXED MOBILE US339 RADIOLOCATION BROADCASTING- SATELLITE US327 5.396	Wireless Communications (27)
			2360-2385 MOBILE US276 RADIOLOCATION G2 Fixed G120	2360-2385 MOBILE US276	
			2385-2390  US363	2385-2390 FIXED MOBILE US363	
			2390-2400 G122	2390-2400 AMATEUR	RF Devices (15) Amateur (97)
			2400-2402  5.150 G123	2400-2402 AMATEUR AMATEUR-SATELLITE 5.150 <del>S5.282</del>	ISM Equipment (18) Amateur (97)
			2402-2417  5.150 G122	2402-2417 AMATEUR 5.150 5.282	RF Devices (15) ISM Equipment (18) Amateur (97)
			2417-2450 Radiolocation G2 5.150 G124	2417-2450 Amateur 5.150 5.282	ISM Equipment (18) Amateur (97)
			2450-2483.5	2450-2483.5 FIXED MOBILE Radiolocation	ISM Equipment (18) Private Land Mobile (90) Fixed Microwave (101)
			5.150 US41	5.150 US41	
2450-2483.5 FIXED MOBILE Radiolocation 5.150 S5.397	2450-2483.5 FIXED MOBILE RADIOLOCATION 5.150 5.394				

\* \* \* \* \*

## UNITED STATES (US) FOOTNOTES

\* \* \* \* \*

USxxx In the bands 135.7-137.8 kHz and 5250-5400 kHz, the amateur service is allocated on a secondary basis.

**PART 97-AMATEUR RADIO SERVICE**

3. The authority citation for Part 97 continues to read as follows:

AUTHORITY: 48 Stat. 1066, 1082, as amended; 47 U.S.C. 154, 303. Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. 151-155, 301-609, unless otherwise noted

4. Section 97.3(b) is amended by adding a new paragraph (4) and renumbering the rest starting with the existing number (4) to read as follows:

**§ 97.3 Definitions.**

(4) LF (low frequency). The frequency range between 3 kHz and 300 kHz.

5. Sections 97.301 (b), (c), and (d) are modified as indicated below.

**§ 97.301 Authorized Frequency Bands.**

a. Sections 97.301 (b), (c), and (d) are each modified to add, at the beginning of the table in each subsection, the following:

Wavelength Band	ITU Region 1	ITU Region 2	ITU Region 3	Sharing requirements See § 97.303, paragraph
LF	kHz	kHz	kHz	
2200m		135.7-137.8		(s)

b. Sections 97.301 (b), (c), and (d) are each modified to add, between the 75m and 40m rows in the table in each subsection, the following:

Wavelength Band	ITU Region 1	ITU Region 2	ITU Region 3	Sharing requirements See § 97.303, paragraph
HF	MHz	MHz	MHz	
60m		5.250-5.400		(t)

6. Section 97.303 is proposed to be amended by revising paragraphs (j)(2)(iii), (j)(2)(iv), and adding new paragraphs (s) and (t) to read as follows:

**§ 97.303 Frequency sharing requirements.**

\* \* \* \* \*

\* \* \* \* \*

(j) \* \* \* \* \*

(2) \* \* \* \* \*

(iii) The 2390-2417 MHz segment is allocated to the amateur service on a primary basis.

(iv) The 2417-2450 MHz segment is allocated to the amateur service on a co-secondary basis with the Federal Government radiolocation service. Amateur stations operating within the 2400-2450 MHz segment must accept harmful interference that may be caused by the proper operation of industrial, scientific, and medical devices operating within the band.

\* \* \* \* \*

(s) No amateur station transmitting in the 135.7-137.8 kHz segment shall cause harmful interference to any Federal fixed or maritime stations; any non-Federal Government fixed station; or, in the polar regions above 60 degrees North latitude, any aeronautical fixed station; nor is any amateur station protected from interference due to the operation of any such station.

(t) No amateur station transmitting in the 5.250-5.400 MHz band shall cause harmful interference to stations authorized in the mobile and fixed services; nor is any amateur station protected from interference due to the operation of any such station.

\* \* \* \* \*

#### 7. Modification to section 97.305 (c)

##### **§ 97.305 Authorized Emission Types.**

(a) Section 97.305 (c) is amended to add the following at the beginning the table:

Wavelength Band	Frequencies	Emission Types Authorized	Standards See § 97.307(f), paragraph:
LF:			
2200m	Entire band	RTTY, data	(14)

(b) Section 97.305 (c) is modified to add the following between the 75m and 40m rows in the table:

Wavelength Band	Frequencies	Emission Types Authorized	Standards See § 97.307(f), paragraph:
HF			
60m	Entire band	RTTY, data	(3) (9)
60m	Entire band	Phone, image	(1) (2)

8. Section 97.307(f) is proposed to be amended by adding new paragraph (14) to read as follows:

##### **§ 97.307 Emission Standards.**

(f) \* \* \* \* \*

(14) The bandwidth of the transmitted signal shall not exceed 100 hertz.

9. Section 97.313 (i) is amended as follows.

**§ 97.313 Transmitter Power Standards.**

b. Section 97.313 (i) is added:

(i) No station may transmit with a transmitter power exceeding 100 W PEP in the 135.7-137.8 kHz segment, and the total Effective Isotropic Radiated Power (EIRP) shall not exceed 1 Watt.